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What Are Dispositional Properties?

Penultimate Draft, Matthew Tugby

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Few contemporary metaphysicians deny that things have dispositional properties. But there remains an underexplored debate about the precise metaphysical status of dispositional properties. According to *dispositional realism*, the dispositions of things are grounded in the instantiations of sui generis universals (or tropes). In contrast, *causal nominalism* proposes that dispositional properties are sets of entities with primitive functional or subjunctive features in common. This chapter critically compares dispositional realism and this new nominalist rival. After defending causal nominalism, it argues that dispositional realism is nonetheless to be preferred on explanatory grounds. On the causal nominalist picture, individuals have no intrinsic nature. This makes it difficult to explain why individuals have the dispositions they have and also why certain dispositions tend to cluster together in the way they do. In contrast, dispositional realism is able to do this explanatory work.

Keywords: dispositions, dispositional realism, causal nominalism, nominalism, universals, subjunctives, explanation.

1. Introduction

Almost all metaphysicians agree that dispositions can truly be ascribed to things, ranging from the fragility of a vase (i.e. the disposition to break easily) to the disposition had by electrons to accelerate in an electrostatic field. What is more, it has recently occurred to many metaphysicians that understanding dispositions may provide the key to understanding natural properties generally. More precisely, it has been thought, first, that all natural properties bestow dispositions of some sort upon their possessors, and second, that all properties should be individuated in terms of these dispositions, thereby providing us with disposition-based transworld identity conditions for all natural properties. This view of properties is called the dispositional theory, or the ‘causal powers’ view, and proponents

include Bird (2007), Mumford (2004) and Shoemaker (1980). The opposing view is categoricalism. According to categoricalism, properties are non-dispositional and so do not in themselves determine the causal dispositions of their possessors. In other words, properties have a self-contained, inert essence, and the transworld identity conditions for properties have nothing to do with dispositions. Insofar as certain properties are associated with certain dispositions, this is merely due to the external laws of nature, which are wholly contingent. Proponents of this categoricalist view include Armstrong (1983) and Lewis (2009).

In this chapter, my concerns lie with the dispositionalist side of the debate, and in particular with the dispute about how dispositional properties are best understood. But the discussion to follow will also be of interest to categoricalists, for it will help them get clear on which version of dispositionalism is the strongest and, therefore, where their biggest challenge is likely to come from. For a long time in the dispositions literature, it had not been clear that those who subscribe to dispositionalism could disagree about the metaphysical status of dispositional properties. The reason is that almost all previous dispositional theories of properties have been developed within a thoroughgoing realist ontology of properties, on which properties are viewed as *sui generis* universals or tropes (e.g. Bird 2007, Mumford 2004 and Shoemaker 1980). I will call these the ‘dispositional realist’ versions of dispositionalism. On the dispositional realist views, it is the instantiation of these *sui generis* properties (universals or tropes) that determine a thing’s dispositions and the subjunctive facts that they entail. But as Whittle (2009) has recently shown, a realist ontology is not the only option for those who think that properties and dispositions are inextricably tied. Another option is what Whittle calls ‘causal nominalism’. On this view, dispositions, or what Whittle calls ‘functional roles’, are said to be more fundamental than properties. On the causal nominalist view, properties are not universals or tropes, but rather sets of individuals which share certain functional roles in common (that is, roles concerning what individuals *would* do causally in certain circumstances). Whittle summarises as follows:

‘In contrast (to dispositional realism) causal nominalism makes facts about the causal powers of things dependent upon facts about what causal relations objects would enter into. There are no *sui generis*

properties of the objects bestowing irreducible powers. Rather, what we have are particulars and facts about what they would do' (2009, 266, words in parentheses added for clarity).

Although causal nominalists do away with *sui generis* universals or tropes, and instead ground dispositional properties in more fundamental functional facts, it should be clear that causal nominalism is a version of dispositionalism, since properties and dispositions are still inextricably tied. The main difference is just that the direction of ontological priority is reversed.

Unlike dispositional realism, causal nominalism is an underexplored view and further work is needed to establish the extent to which it is coherent and defensible. This work is well worth undertaking, given that causal nominalism promises a more ontologically parsimonious view than realist dispositionalism, avoiding as it does the need to posit a *sui generis* category of universals or tropes. In this chapter I hope to contribute to this project by examining some important objections facing causal nominalism. Some of these objections have been discussed by Whittle (2009) herself, but in this chapter we will discuss them in greater detail and also explore some new worries. My overall conclusion will be that while causal nominalism is a view to be taken seriously, dispositional realism is to be preferred on explanatory grounds.

The structure of the chapter is as follows. After explaining causal nominalism in more detail in §2 and §3, I will in §4 address the worry that causal nominalism is viciously regressive or circular in a certain way. I will then respond on the causal nominalists' behalf, using insights from a paper by Holton (1999). In the process of answering the regress worry, however, we will reveal a further aspect of causal nominalism which may be thought to be problematic. The problem in question is that causal nominalism has to view the objects in the world as lacking in intrinsic nature. While this view is not incoherent, we will see in §5 that it brings the disadvantage of making it hard to explain why particulars have the dispositions that they have. A related explanatory problem, discussed in §6, is that causal nominalism does not have the resources to explain in an unproblematic way why certain dispositions tend to cluster together in the way that they do. In §7-§11, we will conclude the chapter by considering possible causal nominalist responses, which will help us to further clarify the ways in which dispositional realism is explanatorily superior.

2. Causal nominalism

Nominalist theories of properties are typically deflationist views about properties. That is, most versions of nominalism do not wish to eliminate properties, but want instead to explain them in ways which do not require us to accept that properties are *sui generis* entities in their own right. This point can be illustrated using the distinction between that which is *fundamental* and that which is *derivative*. On nominalist views, properties come out as being among the *derivative* entities, which is to say they are dependent on and explained by more fundamental aspects of the world. The differences between specific nominalist theories then concern how precisely those fundamental facts are to be understood. The resemblance nominalists, for example, explain properties in terms of primitive facts about the resemblances between particulars, while predicate nominalists explain properties in terms of mind-dependent facts about how predicates are applied.

In a similar vein, causal nominalism also views properties as derivative entities, but rather than explaining them in terms of, say, the primitive resemblances among particulars, it explains them in terms of the causal or functional roles that objects play. What does it mean to say that an object plays a certain causal or functional role? Whittle's answer is that saying '... *a* satisfies the functional role of *F-ness* is merely shorthand for saying that *a* would do X in circumstance *C1*, Y in circumstances *C2* etc.' (2009, 252). In short, then, talk of causal or functional roles is shorthand for talk of *subjunctive* facts: facts about how an object would behave in various circumstances. These subjunctive facts, which capture a thing's dispositional features, are then said to ground facts about natural properties. To illustrate, the claim that some objects share the property of elasticity in common is analysed by the causal nominalist in terms of those objects sharing certain subjunctive features in common, such as the fact that they would all stretch when pulled in a certain way. This kind of causal story is then told about all properties, thereby preserving the central dispositionalist idea that facts about properties are inextricably tied to causal facts. Of course, those with categoricalist intuitions will question the idea that all properties can be associated with dispositions of some sort. Indeed, even philosophers with sympathies towards dispositionalism, such as Ellis (2002), have claimed that not all properties bestow dispositions. Structural geometrical properties are often used as an example (Ellis 2002, 69). But these are challenges facing dispositional realism also, and so in this respect dispositional realism and causal

nominalism stand or fall together. Fortunately for the causal nominalists, dispositional realists such as Bird (2003; see also Mellor 1982) have attempted to respond to these counterexamples on the dispositionalists' behalf, and these are responses that the causal nominalists can also appeal to.

Like most versions of nominalism, causal nominalism is best rendered as a set-theoretic view of properties. On this view, 'the property of *F-ness* can be construed as the set of particulars all of which realize the functional role definitive of *F-ness*' (2009, 248). And as we saw above, for things to realize common functional roles is for the same sorts of subjunctive conditionals to be true of them. Of course, in order to avoid a commitment to universals or tropes after all, the causal nominalist must be clear that subjunctive facts are not themselves to be analysed as a kind of complex (relational) universal (see Tugby 2013), which individuals can instantiate. On Whittle's view, this pitfall is avoided with the idea that subjunctive facts are primitive and so cannot be analysed in terms of other metaphysical notions, as they are on Lange's (2009) metaphysical system also. It is worth pointing out, however, that a causal nominalist could also attempt to provide an analysis of the subjunctive facts in terms of something more basic, as Whittle admits (2009, 281-2). For causal nominalism to be true, all that needs to be the case is that subjunctive facts are *more* fundamental than properties, but this leaves open the question of whether the subjunctive facts are themselves grounded in something even more fundamental. Notoriously, for example, some have attempted to analyse subjunctives in terms of possible worlds and the relations of similarity holding between them. Possible worlds can either be construed as full-blooded concrete entities (see Lewis 1986) or as abstract entities of some sort. We need not settle this in-house dispute here, however, because the critical discussions to follow are unaffected by the details about how, precisely, subjunctive facts are to be understood. The main point for our purposes is just that on the causal nominalist picture, subjunctive facts—whatever they amount to—are more fundamental than, and serve to explain, properties.

We have now outlined the main features of causal nominalism. But before discussing objections, we should first set aside an initial complaint that causal nominalism is likely to invite regarding the equivalence it draws between dispositions and subjunctive facts.

3. Linking dispositions and subjunctives

As should be clear by now, for the causal nominalists facts about properties arise out of facts about dispositions, where the latter are equated with subjunctive facts. But at this point, a dispositional realist might dispute this kind of connection between dispositions and subjunctive facts. They might point out, for example, that in the debate on whether dispositional ascriptions can be *conceptually* analysed in terms of subjunctive conditionals, there is a long history of counterexamples to the conditional analyses offered (see e.g. Martin 1994). And although causal nominalism is concerned with ontological analysis rather than conceptual analysis, the realists might nonetheless take the failure of previous conditional analyses as good evidence that disposition facts and subjunctive facts are not ontologically connected in the way that causal nominalism requires.

This objection is, however, inconclusive. Even if a conceptual equivalence cannot explicitly be drawn between disposition ascriptions and subjunctive conditionals, this would not itself imply that an *ontological* account of dispositions in terms of subjunctives fails.¹ The reason why attempts at the conceptual analysis have failed so far could merely be that the relationships between dispositions and subjunctives are so complicated that we do not have the capacity to articulate them. For any given disposition ascription, perhaps the list of correlative conditionals is open-ended. But our inability to formulate these open ended lists does not imply that, *ontologically*, dispositions do not consist in a complicated network of subjunctive relationships. Whittle puts the point as follows:

‘... as Molnar (1999, 8) points out, a conceptual reduction is not necessary or sufficient for an ontological reduction. So, whilst the functional formula an object must satisfy in order to be fragile may be far too complex to be graspable by us, and so not give the meaning of fragility, it might still be the case that ‘what in reality’ fragility is, can be reduced to facts about what objects would and would not cause.’
(2009, 272)

¹ I think many participants in the dispositions debate have been guilty of making this mistake. Martin (1994), for example, saw the perceived failure of the conditional analysis of disposition predicates as an argument in favour of *metaphysical* anti-reductionism.

I agree with Whittle's sentiment here, and so we will not discuss this objection further. I will just add one further comment. Even if a complete conditional analysis of dispositional predicates cannot be given, it remains overwhelmingly plausible that dispositions and subjunctive facts are intimately connected, as causal nominalism assumes. One good reason for thinking this has been suggested by Manley and Wasserman (2008). They point out that some account must be given as to how ordinary beliefs about the dispositions of things guide our actions, and if the suspicion is correct that disposition facts consist in subjunctive facts, such an explanation is forthcoming: '[W]hen we learn that something is fragile, we treat it with care because we know that many kinds of rough behaviour would lead to breaking' (2008, 73). If, on the other hand, the connection between dispositions and subjunctives is rejected, we are '... simply abnegating the explanatory burden' (2008, 73).

In the next three sections we will now turn to more pressing objections facing causal nominalism.

4. Causal nominalism, circularity, and regress

The first worry concerning causal nominalism is that properties cannot be captured in terms of functional roles in a *non-circular* way. More precisely, the worry is that subjunctive facts must contain reference to further properties. To use an example, a vase would, on the causal nominalist view, be said to be fragile in virtue of it belonging to the set of things which would *break*, were they to be *hit* with a certain force (among other things). But of course, hitting and breakage are further properties, and so it seems we have not eliminated reference to properties from this analysis after all.²

At this point, the obvious way to avoid the circularity is to account for the properties of hitting and breakage in terms of *further* subjunctive facts, thereby reducing talk of these properties in the way that causal nominalism requires. In terms of the property of brokenness, for example, one might point out that broken vases have the disposition to cut flesh (among other things), which is to say that the

² Because properties can both be the manifestations of other properties (as breakage is in the fragility subjunctive above) and also serve as the stimulus for other dispositional properties (as hitting does in the subjunctive above), it is clear that properties will enter into both the antecedents and consequents of the subjunctive facts we are concerned with.

following subjunctive is true: if the broken vase were pushed against flesh in certain way, the flesh would cut. However, it may then be objected that this only delays the problem. In explaining the property of brokenness in this way, we have made reference to yet further properties, namely, the properties of pushing and that of being cut. And so we seem to be on the road to a regress of subjunctive facts.

In fact, this kind of problem is relatively well known. Given that dispositional realism individuates universals (or tropes) in terms of dispositional roles, it too has faced criticisms from many quarters that it is regressive in problematic ways.³ The worry is, roughly, that if dispositional universals (or tropes) are characterised by a directedness towards their manifestation properties, and all universals are dispositional, then whenever we come to pinning down the nature of property, we must set off on a regress of relations which either never ends or come back round in a circle to the property with which we started (see e.g. Lowe, 2006, 138). In response, however, dispositional realists like Bird (2007) have argued that this does not make dispositionalism incoherent. It just means that the nature of a property is determined by its position in a wider structure. And as long as it has a unique position in the property structure, its identity is fully determinate (Bird 2007, 139-140). In short, then, the circular or regressive nature of dispositional realism is something we can live with, according to Bird.

Can a causal nominalist make an analogous move with respect to the regress worry? It seems they can, and indeed this is the route that Whittle (2009) takes. Her response can be traced back to Holton (1999), who in a debate with Blackburn (1990) argues that counterfactual circularities or regresses can be tolerated. Holton shares Blackburn's assumption that dispositions can be analysed in terms of counterfactual conditionals, or what we have called 'subjunctives' (Blackburn 1990, 62, fn. 1).⁴ In articulating the problem, a Lewisian possible worlds analysis of subjunctives is also assumed by Blackburn, and Holton articulates his solution to the problem using this resource. But this is mainly

³ For a survey of these regress problems, see Bird 2007, ch. 6.

⁴ The terms 'subjunctive' and 'counterfactual' are typically used interchangeably, but strictly speaking there can be conditionals in the subjunctive mood with antecedents which are actually true (i.e. not counter to the facts). For the purposes of this chapter, I will stick with the broader terminology of subjunctives.

for the purposes of clarity, as Blackburn remarks (1990, 64). As we will see in a moment, the same points apply if subjunctives are taken to be primitive structured facts, as they are on Whittle's preferred version of causal nominalism (2009, 283).

On the possible worlds analysis, where subjunctives have an actually false antecedent (i.e. where the antecedent is counter to fact) their truth is determined by 'neighbouring' worlds at which the antecedent is true. The neighbouring worlds are those which are most similar to the actual world in certain general respects, for example in terms of the laws that hold and the distribution of particular matters of fact (see Lewis 1973 for details). If the consequent is also true at those neighbouring worlds, the subjunctive as a whole is true. In short, then, subjunctive facts are in some sense constituted out of relations of similarity to certain other worlds. Moreover, if *all* properties are accounted for in terms of dispositional roles (as dispositionalism says), then any properties referred to at neighbouring worlds will themselves be constituted out of further (similarity) relations to other worlds, and so on. Thus the dispositional view leaves us with a regress of inter-world relations, on this interpretation.

Just how problematic is this picture? Blackburn found it deeply puzzling (1990, 64). But as mentioned above, Holton responds that while this relational view of reality is surprising, it is not incoherent. Holton provides an illustration. Imagine that just four dispositional sentences (i.e. sentences which ascribe dispositional properties to certain objects) capture the complete contingent nature of a world. Let us then say, as the causal nominalist does, that each of those property ascriptions are equivalent to subjunctive conditionals involving further property ascriptions, for example:

$$P =_{df} R \Box \rightarrow S$$

$$Q =_{df} S \Box \rightarrow R$$

$$R =_{df} P \Box \rightarrow Q$$

$$S =_{df} Q \Box \rightarrow P \text{ (1999, 10).}$$

Holton then presents us with a model of four possible worlds which is consistent with these definitions, assuming a standard possible worlds account of subjunctives (1999, 11-2).⁵ This model shows that although each property ascription is defined in terms of modal relations between further states of affairs, this yields no contradictions, even though it means that all dispositional states of affairs are relationally defined. The only remaining problem to consider is whether the overall circularity of these definitions is especially problematic. Holton suggests not. Although we cannot understand any of the dispositional ascriptions prior to any others, we can come to understand each ascription simultaneously and holistically, by grasping the relations between them, just as we do on Bird's relationist picture described earlier.

As we saw, Whittle does not endorse a possible worlds understanding of subjunctives, preferring instead to view subjunctive facts as unanalysed primitives. But however primitive subjunctive facts are to be understood, what is clear is that they are structured facts which modally relate one state of affairs to another. What this means is that a thing's having a certain property is always a relational matter, grounded in facts about how various states of affairs are modally related. And so, like Holton and Bird, her only option is to embrace a relational conception of properties and to insist that such a conception is not guilty of incoherence.

I agree that such a view is not incoherent, but that does not mean it would not be surprising, for it entails that an object's nature is never intrinsic to it, as Holton readily admits. And perhaps this feature of causal nominalism will yet show itself to be problematic in certain ways. In the next section, we will explore this feature further and see that this aspect of causal nominalism may create explanatory problems. Importantly for the dispositional realists, these are problems that they can avoid.

⁵ To be precise: at w_1 P, Q, R and S is the case, at w_2 \sim P, Q, R and \sim S is the case, at w_3 P, \sim Q, \sim R and S is the case, and at w_4 \sim P, \sim Q, \sim R and \sim S is the case (Holton 1999, 12).

5. The problem of intrinsicity

In the last section we saw how dispositional realism and causal nominalism share a relational conception of reality in some sense. Does this mean that, in this regard, the two views stand and fall together? I will argue the answer is ‘no’: there is an important difference in the kind of relationism to which causal nominalists and at least some dispositional realists are committed. Causal nominalism entails a more radical form of relationism, and this gives rise to some explanatory problems that dispositional realism can plausibly avoid.

First, let us see why causal nominalism is committed to a more radical relationism than at least some versions of dispositional realism. Dispositional realists like Bird (2007) and Mumford (2004) hold a universals (rather than trope) theory of properties. And as we mentioned above, according to the Bird-type dispositional theory of universals, the nature of a universal is constituted by its relations to its manifestation (and stimulus) properties. On this version, then, the relationism is *at the second-order level*, i.e. the level of universals. But as Bird has emphasised (2007, 140-1), this leaves open the question of whether *first-order particulars* are relationally constituted. First-order relationism, a view which Dipert (1997) for example holds, is a further view to which the dispositional realist may or may not wish to commit. If dispositional realists hold that universals can be instantiated intrinsically to their possessors, then they will reject the view that particulars are relationally constituted, even though the universals themselves are.

What this shows, then, is that on at least some versions of dispositional realism, one can consistently hold that particulars have intrinsic features. But what about causal nominalism? It is hard to see how they can similarly accommodate the idea that particulars have intrinsic natures. The main reason is that, as a version of nominalism, such a view is unable to make first-order/second-order distinctions. Thus, the relational aspects of causal nominalism discussed earlier must come in at the *first-order level of particulars*. To see this more clearly, note that on the causal nominalist picture, the subjunctive relations out of which properties are constituted relate *first-order* states of affairs. Subjunctive facts, whether construed as primitive or analysed in terms of possible worlds, have the following form:

$a \text{ is } F \square \rightarrow b \text{ is } G$

That is, in their most basic form they concern what would happen to a certain *individual* were certain circumstances to come about. On the causal nominalist picture, *all* of the properties which characterise individuals are analysed in terms of further subjunctive facts like this. Thus, this view is best described as the view that first-order objects are constituted by the subjunctive relationships they enter into. The relationism clearly occurs at the first-order level, which is as it should be, given that the nominalist does not have the resources to appeal to second-order relations.

What is the relevance of this difference? Well, insofar as one agrees with Blackburn (1990) that it is problematic to think of individuals or even worlds as a whole as having no intrinsic nature, one will be more worried about causal nominalism than dispositional realism, given that the latter could be developed in a way that avoids first-order relationism. Heil for one has remarked that the result of first-order relationism is ‘a holism empty of content’ (2003, 108). The worry here is that it is difficult to conceive of how reality could be substantial enough to give rise to the world we inhabit, if objects were relationally constituted.

In short, those who think it is difficult to square first-order relationism with our ordinary conceptions of the world will think that dispositional realism is more attractive than causal nominalism. But is this really a conclusive reason for favouring dispositional realism? The problem is that counter-intuitiveness may be a bullet that the causal nominalist is willing to bite. Indeed, Whittle herself is open about the fact that intrinsicness intuitions are contravened by causal nominalism (2009, 282).

I think the dispositional realists can expand their objection, however. Perhaps what is really doing the work in the counter-intuitiveness worry is this. It seems overwhelmingly plausible that the intrinsic natures of things should play an important role in *explaining* why things have the dispositions they have (or to put it in causal nominalist terms, why certain subjunctive facts hold). But on the causal nominalist picture, we are robbed of this kind of story. We can no longer claim that, say, there is something about the intrinsic nature of an electron which explains why it accelerates in an electrostatic field rather than not. Instead, particulars are in themselves much like intrinsically

featureless blobs, and so there is nothing about them that constrains the dispositions they have. Their dispositions are just brute facts which are imposed upon things in an apparently arbitrary way.

Again, perhaps the causal nominalists will just shrug their shoulders. But what begins to emerge at this point is that causal nominalism lacks explanatory power in certain respects. And those who like explanatorily rich metaphysical systems will favour dispositional realism for that reason, since it explains dispositions and the subjunctives they involve in terms of the intrinsic property instantiations of things. We will also see in the next section that there is a further sense in which causal nominalism is at an explanatory disadvantage as compared with dispositional realism. When all of these explanatory disadvantages are put together, the dispositional realists will think that the balance is tipped in their favour, all else being equal.

6. The problem of subjunctive clustering

Let us begin with a new observation: our world displays very specific patterns in the way dispositions are distributed. For instance, when a particular has one disposition, it often turns out to be the case that it has certain other dispositions. In short, our world contains many regularities in terms of how dispositions *cluster*. And one may think that these regularities should be explained in some way. At this point, the dispositional realists may highlight that their view can bring precisely this explanatory advantage. The dispositional realists' universals, they may point out, could serve to underpin and unify a diverse range of dispositions. On this view, the reason why certain dispositions always go together is that they are each part of the essence of a certain universal which exists in our world (examples given later). In contrast, it may be argued, the causal nominalists have to view it as a brute fact as to which subjunctive clusters apply to particulars, since they do not have the notion of unifying *sui generis* universals to appeal to.

Before looking at the details of this line of argument, let us first corroborate the claim that dispositions often seem to cluster in a certain way. In fact, examples at both the macroscopic and microscopic levels are not hard to come by. To use an everyday case consider, for example, how cricket players wear pullovers that are disposed to appear a certain way to normal human observers; namely, they give us the 'white' visual sensation. The reason why cricket players wear pullovers that

appear white is that these pullovers also have the disposition to resist absorbing heat, in virtue of being white. So here we have a correlation: every pullover that appears white (in ordinary circumstances) also has the disposition to resist absorbing heat.

With this case in mind, a dispositional realist may raise the following worry for causal nominalism: the various dispositions associated with whiteness, which are each equivalent to subjunctive facts on the causal nominalist picture, appear to be distinct. That is, the fact that cricket pullovers would look a certain way to normal observers and the fact that cricket pullovers would absorb little heat when exposed to sun rays are each distinct subjunctive facts. Why, then, is it that both of these subjunctive facts always hold of certain particulars, namely cricket pullovers? If an answer cannot be found, then dispositional realism may have an explanatory advantage. The dispositional realists can appeal to the universal of whiteness, which cricket pullovers share, and can say that it is of the essence of that universal that it bestows a particular set of determinate dispositions upon its possessors.

In response, however, perhaps we should not place too much weight on macroscopic examples. Perhaps the clustering of macroscopic dispositions can be explained by mechanisms operating at lower levels, such as molecular structures and their vibratory properties in the colour case. If a mechanistic explanation could be found for why certain molecular properties give rise both to certain reflective capacities and capacities for heat absorption, then the mystery would be solved. The causal nominalists would, of course, have to translate talk of microscopic properties into talk of further subjunctive facts, but there seems no obvious reason why certain 'lower level' subjunctives could not be explanatory of higher level ones.

However, fortunately for the dispositional realists, the fundamental level of nature also exhibits very specific patterns in terms of how dispositions cluster. Consider, for example, the disposition had by a particle to feel a force of 3 dynes when in a field of 1 dyne per statcoulomb. Any particle which has this disposition also has the disposition to feel a force of 6 dynes when in a field of 2 dynes per statcoulomb. And in fact, particles with these dispositions have an infinite number of other specific dispositions, as captured by the laws governing charge. But again, each of these individual dispositions, or what the causal nominalists call subjunctive facts, appear distinct. There is no obvious

reason why having the disposition to feel a force of 3 dynes when in a field of 1 dyne per statcoulomb should entail the disposition to feel a force of 6 dynes when in a field of 2 dynes per statcoulomb. And unlike the macroscopic case, there are apparently no lower level explanations that can be appealed to.

What can be said at this point? As we saw earlier, the dispositional realists have an explanation at their disposal. They can ground distinct dispositions/subjunctives in the universals instantiated by the relevant particles, such as the universal of having, say, a charge of 3 statcoulombs in the imaginary case just discussed. On this picture, then, there is not a one-one correspondence between universals and dispositions. The relationship is, instead, typically one-many, with the universals serving to ground and unify dispositions which are otherwise distinct. Indeed, this picture is one that is advocated by a number of current realist dispositionalists, as Dumsday (2013, 873) has recently pointed out. Ellis illustrates this one-many view when discussing the universal of refractivity:

The refractivity of a certain kind of glass, for example, is a dispositional property of the glass that grounds infinitely many behavioral dispositions. The dispositions it grounds are characterized by a range of quantitatively different circumstances (different angles of incidence, different frequencies of incident light, different refractivity of the medium, and so on) resulting in a range of quantitatively different effects (different angles of refraction, total internal reflection, and so on) (Ellis 2001, 120).

Can a causal nominalist tell a similar story? Prima facie, it seems not. Given that specific functional facts are each primitive and distinct, it looks as though the distribution of them must be left as a brute, unexplained fact.

This concludes our initial exposition of the explanatory deficiencies of causal nominalism. We will now, in the next five sections, consider some possible causal nominalist responses at length and argue that they do not ultimately succeed. The first response to be considered in the next section is that, overall, the explanatory advantages of causal nominalism and dispositional realism are roughly equal. The second and more ambitious response, considered in §8, suggests that the dispositional realist's 'explanations' are akin to *virtus dormitiva* explanations, which is to say trivial. After showing that dispositional explanations are in general non-trivial, we will in §9 return to the issue of explaining

disposition clustering.⁶ In §9 and the two sections to follow, we will consider various causal nominalist attempts to explain disposition clustering. I will argue that these causal nominalist responses are ultimately unsuccessful, and this discussion will help to further clarify the senses in which dispositional realism is explanatorily superior.

7. Causal nominalist responses: Honours equal?

I have argued that dispositional realism is to be preferred because it can explain certain dispositional phenomena in a way that causal nominalism cannot. However, perhaps a causal nominalist could concede all of this and then point out that, likewise, causal nominalism can explain things that dispositional realism cannot. If that is right, it could be that once *all* explanatory factors are taken into consideration, we will find that causal nominalism and dispositional realism are roughly equal on points.

The first thing a causal nominalist might point out is that although they must take functional facts to be primitive, the dispositional realists must also have primitives which cannot be further explained. Most obviously, the dispositional realists' universals must be taken as primitives, as well as the relation of property instantiation which realists generally have to posit. But recall that for a causal nominalist, talk of properties and their instantiation is explained by something further. That is, properties are analysed as sets of objects which share certain functional facts in common, and for a thing to instantiate a property is just for it to be a member of such a set. Taking all of this into consideration, then, it may be that dispositional realism and causal nominalism have equal, though opposite, explanatory advantages.

In the course of responding to this objection, I think it must be conceded that causal nominalism does bring its own explanatory benefits. For as we saw in §1, although causal nominalism does not take properties to be fundamental, it is similar to most nominalist views in that it does not seek to eliminate properties altogether. Rather, it tries to ground and thereby explain properties using more

⁶ Here I am indebted to an anonymous referee for raising objections along the lines of those discussed in §7-§9.

basic metaphysical resources. Where, then, does this leave us? I believe there are at least two points that a dispositional realist must emphasize in order to keep the balance in their favour.

First, although causal nominalism is not without its own metaphysical explanations, we can of course ask which of the two explanatory packages is the most beneficial. Here, other theoretical virtues inevitably come into play, such as coherence with common sense and coherence with the other metaphysical theories that we hold. It is at this point that I believe the concerns raised in §5 come to the fore. Recall our observation that causal nominalism provides a rather radical relational view of the world. Sure, the causal nominalists can explain propertyhood, but because propertyhood is explained in terms of relational functional facts, this means that objects do not have intrinsic natures. Although such a view may not be incoherent, this does not mean it does not commit other theoretical vices. Indeed, I believe that our ordinary view of objects is that they are not featureless blobs, and that the dispositions of a thing are determined by the *intrinsic* nature of that thing. A ball has the disposition to roll down a hill *because of the way the ball is in itself, namely, its spherical nature*. And the sphericity of a ball seems like an intrinsic property *par excellence*. Moreover, much metaphysical theorizing about dispositions favours the thought that dispositions are grounded in the intrinsic ways that things are. For instance, those who take dispositions metaphysically seriously typically say that a disposition can be present even if the thing with that disposition is never in a position to manifest it. It seems, for instance, that salt will have the disposition to dissolve in water no matter which environment it finds itself in, and this seems to provide *prima facie* support for thinking that such a disposition is intrinsic to salt.

Now, I do not claim that this response provides a knock-down argument, because the causal nominalists will no doubt try to accommodate talk of intrinsically by watering down the notion in some way.⁷ My point is just that if causal nominalists have to revise concepts like that of intrinsicity, then in terms of conservativeness the view does not score well.

⁷ One strategy would be to say that although all properties of things are, strictly speaking, relational, some of these properties are more sensitive than others to the environments in which the relevant objects are situated.

Some further explanatory considerations can also help the dispositional realists' case. Although I have not said much about this issue so far, it is plausible that universals have an explanatory significance that goes well beyond issues relating to dispositions. Here is one important example: Elsewhere (2013), I have argued that although Whittle (2009, 249) thinks causal nominalism provides an illuminating response to the one over many problem, it is far from clear how this can be the case. The one over many problem challenges us to explain how it is that distinct particulars can have what appears to be the same nature. Realism about universals provides the traditional and most obvious response to this problem. According to realism about universals, distinct objects can share the same properties because they can literally have the same constituent in common, namely, a universal. But how can a causal nominalist answer the problem? Causal nominalists explain common properties in terms of the sharing of functional roles. But talk of such 'sharing' sounds suspiciously like another 'one over many' fact, which the one over many problem will urge us to explain. Unfortunately, this is where Whittle leaves us disappointed, because functional role predications are ultimately left as unanalysed primitives, as we have already seen. For this reason, it seems that Whittle's causal nominalism is best thought of as a version of Quinean nominalism, which simply refuses to engage with the one over many problem (again, see Tugby 2013 for further details). That may be fine for those who are already sympathetic towards Quinean nominalism. But for the rest of us who think that the one over many problem is genuine, dispositional realism will be seen to have a distinct explanatory advantage.

Of course, nothing I have said in this section rules out the possibility of the causal nominalists finding their own wider explanatory advantages. But it is far from clear what such advantages would be, and it remains for causal nominalists to undertake such work. As things stand, then, the explanatory advantages are tipped in dispositional realism's favour.

The properties we call 'intrinsic' could then be described as those whose instantiations do not vary much at all with changes in the environmental circumstances of the relevant objects.

8. Causal nominalist responses: Virtus dormitiva objections

Let us now consider whether a causal nominalist could pursue a more ambitious response. Perhaps it could be argued that in fact dispositional realism does not really explain much at all, because the ‘explanations’ in question cannot be anything other than trivial. It might be pointed out that all ascriptions of dispositional properties do for dispositional realists is to pick out those properties (universals) in terms of their causal roles of bringing about further properties. And surely a universal picked out in the manner of ‘the cause of E’ can offer only a trivial explanation for the cause of E. Such an explanation would be akin to the virtus dormitiva explanation given by Bachelierius in Moliere’s famous joke (1926, 328). When asked how it is that opium induces sleep, Bachelierius replies that there is in it a dormitive virtue, prompting mockery from the Chorus as a result.

Before addressing the details of this objection, it is worth pointing out that the causal nominalist would be ill-advised to press the virtus dormitiva worry too forcefully, for it may also threaten to rob their view of any explanatory power. While dispositional realists think that universals help to explain why things behave as they do, the causal nominalist thinks that dispositions (*qua* functional facts) help to explain why things behave as they do. But like the dispositional realists’ universals, functional facts are identified by the causal effects that they are orientated towards. Hence, if dispositional realism faces virtus dormitiva objections, then causal nominalism will too.

Fortunately, work has already been undertaken by dispositional realists to show that in many cases, dispositional explanations are fully informative and indeed indispensable in science (see e.g. Mumford 1998, 136–41 and Mumford and Anjum 2011, 133). Sticking with the theme of Moliere’s joke, let us illustrate how an explanation appealing to the dormitive disposition of a potion might in some cases be genuinely informative. Imagine that while delivering a metaphysics lecture, you unexpectedly fall asleep. Clearly, the students would be surprised by this. But suppose they were subsequently told you had taken a potion with a dormitive dispositional property. Would not such an explanation be most informative? Prior to being told this, there would have been many hypotheses on the table about why you had fallen asleep. For instance, you might have been ill and fainted, or you might have fallen asleep through exhaustion, having been awake all night pondering the nature of dispositional properties. However, after learning about the dispositional properties of the recent

beverage, these other hypotheses are ruled out and the mystery solved. Moreover, an important point highlighted by Mumford and Anjum (2011, 133) is that such explanations are perfectly respectable in science given that they are falsifiable. Although we might have been told with confidence that the potion you drank had a dormitive virtue, it could later be discovered that the sleep was in fact explained by a mischievous student hitting you with a minute tranquiliser dart.

So far, so good. At this point, however, the causal nominalist might seem to have a dialectical advantage. Providing that the sort of explanatory story above can be told within the causal nominalists' framework, it seems causal nominalism will be able to do as well as dispositional realism where common dispositional explanations are concerned. It is for this reason, I think, that the second of my explanatory arguments from §6, concerning disposition clustering, may be the decisive factor. In the next section, then, let us consider how a causal nominalist might try to respond to the claim that dispositional realism is explanatorily superior where the specific issue of disposition clustering is concerned.

9. Causal nominalist responses: The nested subjunctive strategy

As well as the kind of non-trivial dispositional explanation outlined in the last section, I claim that dispositional realism can provide non-trivial explanations for disposition clustering. Such cases, to recall, involve a dispositional property grounding a wide range of determinate dispositions. Sticking with the potion example, imagine that on one occasion a potion causes me to go to sleep, and that on another occasion a distinct but similar potion causes you to go to sleep. Suppose also that these incidents are explained by the fact that both potions have a generic dispositional property (universal), which is the property to induce sleep in *any* human who drinks it.⁸ Such a dispositional property would be of a sort that grounds a potentially infinite number of determinate dispositions, such as the disposition to make me go to sleep, you go to sleep, the Dali Lama go to sleep, and so on. Clearly, appealing to a generic dispositional property like this does not leave us with a non-trivial explanation. Alternative explanations were possible. One alternative explanation would be that while the potion I

⁸ Again, I am grateful to an anonymous referee for raising this particular example.

drank had the disposition to induce sleep in me, and only me, your potion had the disposition to induce to sleep in you, and only you. Clearly, such potions would be different to potions with the ability to induce sleep in any person, in which a huge range of determinate dispositions are clustered together. In §6 I claimed that it is an advantage of dispositional realism that it can appeal to dispositional universals like this in order to ground a wide range of determinate dispositions. It is time to consider, then, what a causal nominalist could say by way of response.

The best hope for the causal nominalist is perhaps a suggestion made briefly by Dumsday (2013, 873-4) on precisely this issue. Perhaps the causal nominalists could try to mirror the dispositional realists' clustering explanation by replacing talk of a unifying universal with talk of a more basic, generic subjunctive fact obtaining. Let us say that potion *a* has a certain generic dispositional property, such as dormitivity, which we will call *F*. Let us now capture two of the specific dispositions associated with *a*'s having *F* (where, say, *S*₁ means 'is ingested by Peter', *M*₁ means 'sends Peter to sleep', *S*₂ means 'is ingested by Jane', and *M*₂ means 'sends Jane to sleep') using the following two subjunctives:

$$S_1a \Box \rightarrow M_1a \text{ and } S_2a \Box \rightarrow M_2a$$

Now, suppose the causal nominalists were then to offer the following nested subjunctive as an explanation for why these two particular dispositions have converged on *a*:

$$Fa \Box \rightarrow (S_1a \Box \rightarrow M_1a \text{ and } S_2a \Box \rightarrow M_2a)$$

In effect, this states that if *a* were to have a certain generic dormitive property (*F*), then *a* would have two determinate dispositions (understood as further subjunctive facts). This story, the causal nominalists may urge, is structurally similar to the dispositionalists' claim that the instantiation of dispositional universal *F* grounds the relevant determinate dispositions/subjunctives.

Is this response successful? I fear not. The question to ask at this point is whether this nested conditional really is *explanatory*. The problem is that in order for it to be explanatory, *a*'s having generic disposition F must be prior in some way to the determinate dispositions (i.e. subjunctives) which it gives rise to. At this point, a dilemma presents itself.

On one interpretation of the nested subjunctive (which constitutes the first horn of the dilemma), *a*'s being, say, dormitive (F) *just is* the fact that *a* has certain determinate dispositions. But it is obvious that this will not do, if the nested subjunctive is to do genuine explanatory work. Surely the nested subjunctive cannot be explanatory of the determinate dispositions associated with F if F is nothing over and above those determinate dispositions. In short, then, the nested conditional above cannot be anything but trivial on this interpretation. In contrast, the dispositional realist's explanation is not trivial, since the instantiation of a universal is a phenomenon that is distinct from the holding of a subjunctive fact. Let us therefore consider the most obvious alternative causal nominalist approach. Unfortunately, we will see that this constitutes the second horn of the dilemma.

10. Causal nominalist responses: The laws strategy

The foregoing discussion demonstrates that for the causal nominalists' response to succeed, a generic subjunctive fact, such as dormitivity, would have to resist reduction to its associated determinate dispositions. Can this be achieved? Unfortunately, we will see that the most obvious way of developing this alternative strategy leads to problems.

The problem is that in order to resist the reduction of generic dispositions, the causal nominalist has to posit a new and more basic kind of fact within their framework, and this makes their view unstable for reasons I will explain. These new facts must have a generic character, and given that they are supposed to be distinct from the specific determinate dispositions they explain, the role they play looks to be essentially that of a *law*. To illustrate, in order to properly explain why, say, a certain charged particle is disposed to feel a force of 3 dynes when in a field of 1 dyne per statcoulomb, and also a force of 6 dynes when in a field of 2 dynes per statcoulomb, the causal nominalist has to appeal to the distinct and generic fact that such particles would feel a force of $3n$ when in any field of n dynes per statcoulomb. And this sort of fact has all of the hallmarks of a functional law. This will hardly

come as a surprise to the dispositional realists, because most dispositional realists are open about the fact that their dispositional universals essentially play the same role as laws on governing conceptions of lawhood (see e.g. Bird 2007 and Mumford 2004). Hence, if the causal nominalists seek to mirror the dispositional realists' explanations, it is not surprising that they will end up with something like laws in their picture.

The causal nominalists might think this is all fine. Indeed, this seems to be the sort of view that Whittle ultimately has in mind when she says that: '... causal counterfactuals are unified into cohesive clusters by scientific laws' (2009, 276). I do not think that matters are quite so simple, however. To recall, the basic causal nominalist idea was supposed to be that things share certain properties if they share certain specific functional facts in common. Importantly, such functional facts were taken as primitives and so not further explainable. According to the new proposal, however, it seems the specific functional facts *are* further explainable. On the new picture, the diverse range of specific functional facts that hold of, say, a charged particle, are explained by the irreducible generic laws that such particles fall under. It is therefore these laws that are primitive and which are doing the metaphysical work, rather than the determinate functional facts.

Perhaps, however, the above point just means that causal nominalism has to be modified in some relatively minor way. A more important question, then, is whether the idea of an explanatory law sits easily within the nominalist's framework. This is where I think the serious problems emerge. A general problem for any non-reductive view of laws is to explain exactly what laws are like and how it is that they are able to carry out their explanatory work (see e.g. Mumford 2004, who thinks existing versions of nomological realism should be rejected because of this problem). What is important to emphasise once again is that if laws are going to be explanatory of the distributions of determinate functional facts, it cannot be that laws are simply *expressions* of those distributions. In order for laws to play any explanatory role, they have to be distinct, singular entities in their own right, something over-and-above the clustering regularities they entail. In other words, the causal nominalists require a *non-deflationist* view about laws. The problem is, however, that it is hard to see how any form of nominalism, and in particular causal nominalism, can avoid a deflationist view of laws. The reason is that in order for laws to be distinct entities which are explanatory of their instances, it looks like there

must be something common to those instances which serves as the unifying explanatory factor. This means, in short, that something like universals must be constituents of laws. But these are precisely the kinds of entities which nominalists deny, holding as they do a particular-only, first-order ontology. For the nominalists, each instance of a law is strictly distinct, in which case they do not have a unifying entity in common. This leads Bird to conclude that ‘The nominalist is clearly committed, at best, to some regularity theory of laws ...’ (2007, 18).

In short, then, in order for the laws strategy to work as a genuine explanation for clustering regularities, the causal nominalist would have to show clearly that they are not committed to a deflationist theory of laws, something which Whittle does not do. And without universals in play, it is very difficult to see how a unified explanation of disposition distributions (among other things) can be provided.

11. Causal nominalist responses: The natural kind essence strategy

Let us now consider a final strategy that the causal nominalists might try to pursue in order to explain disposition clustering. This strategy is also one that allows the causal nominalists to answer the first worry that, on their picture, there is nothing about the intrinsic natures of particulars that explains why they have the dispositions that they do. For that reason, it might seem an attractive strategy.

The strategy in question would be to hold that, after all, there is something about particulars (intrinsically) in virtue of which certain subjunctives are true of them. But unlike the dispositional realist strategy, this would not involve appealing to the instantiations of property universals. Instead, the causal nominalists might try to appeal to a different kind of ontological category: the category of *natural kind* essences, or what are sometimes called ‘substantial forms’. Natural kinds characterise particulars as a whole, as opposed to properties which capture only certain aspects of particulars. For example, a particle may be said to have the kind essence of ‘electronhood’ or ‘protonhood’, which entails a complete property profile. To be sure, it would be unusual for a property nominalist to adopt a robust and irreducible category of natural kinds, since nominalists typically prefer their ontologies to be as sparse as possible. But nonetheless, it is far from obvious that a position which couples causal

nominalism with realism about natural kinds is contradictory, and examination of such a view may, for all we know, reveal further benefits.

The central idea would be to accept that, after all, particulars have an intrinsic essence, but to insist that this essence is irreducible to the dispositional properties of those particulars (or in causal nominalist terms, to the subjunctive facts which hold of those particulars). This kind essence could then be claimed to be the ultimate source from which the subjunctive facts flow, thereby providing the required explanations. In short, the kind essences would be playing the same role as the dispositional universals on the dispositional realists' view.

To illustrate further, this sort of picture can be regarded as a causal nominalist version of the natural kinds view presented by Dumsday (2013, 874-8). Dumsday is a natural kind essentialist who grounds dispositional properties in kind essences, but unlike the causal nominalists, Dumsday takes dispositional properties to be real and *sui generis*, even though grounded in natural kind essences. On this picture, then, the order of explanation is as follows: kind essences ground dispositional properties (universals/tropes) and dispositional properties (universals/tropes) ground whatever subjunctive facts are associated with them. But on the causal nominalist picture we are currently considering, kind essences ground subjunctive facts directly, while it is the subjunctive facts that then ground properties. Thus, the order of priority between properties and subjunctive facts is reversed. Importantly, though, the explanatory upshot is the same. Like the Dumsday-type realist, the causal nominalist can now say, as Dumsday does (2013, 874-8), that the disposition clusters are ultimately explained by the intrinsic kind essences of particulars.

So far, so good. But is the coupling of causal nominalism with natural kind essentialism plausible? Unfortunately, although it is not a contradictory position, it does have some awkward features which undermine some of the initial motivations for causal nominalism.

The first rather obvious point is that causal nominalism's main attraction was supposed to be that it provides a more parsimonious ontology, given that it does away with a *sui generis* ontological category of properties. But if causal nominalism makes a realist commitment to natural kinds, then it is far from clear that we end up with a more parsimonious ontology. By adding the category of natural kinds to the category of particulars, the causal nominalist ends up with the same number of

ontological categories than most dispositional realists. And so, the causal nominalists' argument from economy is undermined.

There are also other nominalist arguments which are undermined by a commitment to the category of natural kinds. One of the most effective arguments that has been used by most nominalists is that a commitment to universals brings with it a host of difficult puzzles, all of which lend weight to the worry that universals are strange entities. While Whittle does not take the strangeness consideration to be conclusive, she does point out that 'it is a powerful motivating factor underlying philosophers' choices' (2009, 255). I will not go into the details of these puzzles or their possible solutions here. The important point for current purposes is just that by adopting natural kinds into their ontology, causal nominalists are likely to face similar puzzles. This is because natural kinds are themselves a kind of universal. That is, they are type entities which can be tokened by multiple particulars at the same time. This means that a metaphysical account of this tokening needs to be offered, just as it does on property realist views.

Worse still, the property realists could argue that natural kind realism is *more* problematic than property realism. The most pressing challenge facing natural kind essentialists is to say precisely what kind essences are, given that they are supposed to be irreducible to the properties they give rise to. The dispositional realists can at least say that the properties of things are accessible to us, since a subset of the dispositions bestowed by properties include dispositions to affect our perceptual faculties or our measuring instruments. Kind essences, on the other hand, lie behind a thing's properties in some sense and presumably do not themselves bestow causal powers. If they did, then the kind essences would seem more like universals in the dispositional realist's sense. In short, it is easier to say what a kind essence is not rather than what it is.

In sum, if the causal nominalists were to adopt natural kind realism, they would invite several problems, some of which are arguably more serious than those facing the dispositional realists. As things stand, then, we must conclude that the coupling of causal nominalism with natural kind realism is an unstable marriage.

12. Conclusion: In favour of dispositional realism

Dispositional realism and causal nominalism offer very different metaphysical accounts about the nature of dispositional properties. Dispositional realists explain dispositions in terms of sui generis universals (or tropes), while causal nominalists explain dispositional properties in terms of fundamental subjunctive facts. We have seen that causal nominalism is certainly not a non-starter: attempts to show that it is problematically circular or regressive fail. However, causal nominalism does bring with it some unfortunate features, one of which is that particulars do not have an intrinsic nature. The causal nominalist may be happy to bite the bullet here, but this comes at the cost of explanatory power. Moreover, a causal nominalist is unable to explain in a satisfactory way why certain dispositions tend to cluster together in a law-like way. Given that explanatory power is an important theoretical virtue, I conclude that causal nominalism has not yet replaced dispositional realism as the most plausible version of dispositionalism.

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